Knowledge development and research utilization in evidence-based wound care
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The effectiveness of six common dressings for donor site wounds after split-skin grafting. A systematic review

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Adapted from: Cochrane Database of Systematic Reviews (submitted)
Abridged version of Cochrane Systematic Review
ABSTRACT

**Background:** To cover donor site wounds (DSWs) after split-skin grafting, a variety of wound dressings is available. However, the best choice to support the quick and uneventful healing of DSWs is still unclear. Therefore, the available evidence on the effectiveness of six commercially available dressings to treat DSWs was studied.

**Methods:** A systematic review was performed of trials comparing the effectiveness of at least two of the following dressings in adult patients with DSWs after split-skin grafting for any indication: alginates, films, gauzes, hydrocolloids, hydrofibers and silicones. The outcomes assessed were wound healing, pain, infection rates, itching, costs and scarring. Five databases were searched for randomized clinical trials (RCTs) up to September 2011. Trial selection, quality assessment, data extraction and synthesis were conducted by two authors independently.

**Results:** Of the 635 citations identified, 18 RCTs met the inclusion criteria. Sample sizes ranged from 8 to 60, totaling 560 patients. Trials reported on gauzes (n = 14), hydrocolloids (n = 8), films (n = 7), alginates (n = 3), and hydrofibers (n = 3). Based on trials of mediocre quality, hydrocolloids and films seemed the most beneficial with regards to wound healing (up to 8 days quicker) and pain (up to 3 points lower on a 10-point scale) as opposed to gauze dressings. Infections rarely occurred among all groups. No significant differences were found in itching scores.

**Conclusion:** It appears that dressings which create a moist environment (such as hydrocolloids and films), should be incorporated in wound care protocols. However, a large, well–designed trial is warranted to corroborate this recommendation.
BACKGROUND

Split-skin grafting is a widely used reconstructive technique for traumatic, chronic and burn wounds. Harvesting the skin leaves a donor site wound (DSW). The optimum local care for DSWs should promote wound healing, while preventing complications, such as pain, infection and scarring.

At present, a large number of dressings and topical agents for DSWs are available. Alginates are most commonly used to cover DSWs, probably due to their additional haemostatic properties. Other popular dressings include gauzes, films, hydrofibers and silicones.

Up to now, three reviews showed a lack of strong evidence for the effectiveness of different dressings for the treatment of DSWs. These reviews tentatively concluded that dressings which promote a moist wound environment, in particular hydrocolloids and films, are preferable in terms of wound healing. Films seemed to decrease pain more than other dressings, although they were also found to have practical disadvantages, such as the accumulation of fluids underneath the film in the acute phase of wound healing. Hydrocolloids appeared to be the most widely studied dressing and led to faster wound healing than wound products which promoted a non-moist wound environment. However, these were less popular in daily practice, possibly due to the more frequent dressing changes required because of wound leakage.

The need for the present systematic review of the treatment options for DSWs is based firstly on the belief that evidence-based decision making should preferably be based on studies with the least risk of bias, i.e. randomized clinical trials (RCTs), which was not the case in the previous reviews. Second, the latest review only included studies prior to 2008. The continual updating of systematic reviews by adding recent trials helps to find the true effect of an intervention. Third, Voineskos et al. compared dressings that do with those that do not promote a moist wound environment for the treatment of donor sites, whereas the clinical effectiveness of the dressings within the moist dressing group is also relevant. Lastly, given the large variation in treatment options for DSWs, a new systematic review could offer more uniform recommendations for daily practice. As a result, this practical advice may promote behavioral changes among caregivers and the implementation of research findings.

Therefore, a relevant systematic review was carried out, focusing on six dressing materials, including five commonly used dressings as well as hydrocolloid, which is a promising dressing material identified from the literature. The effectiveness of these six dressings for the treatment of patients with DSWs after split-skin grafting was assessed, in terms of wound healing, pain, infection rates, itching, costs and scarring.
METHODS

The methods and results in this systematic review are summarized according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement for the conduct of meta-analyses and intervention studies.\textsuperscript{11,12}

Eligibility criteria

RCTs were eligible if they compared at least two of the following dressings with each other for the treatment of DSWs: alginates, gauzes, films, hydrocolloids, hydrofibers and silicones. Moreover, they had to address at least one of the following outcomes: complete wound healing (i.e. complete re-epithelization), pain (using a Visual Analogue Scale), infection rates, itching, costs and scarring (using the scores of the Vancouver Scar Scale (VSS) or the Patient Observer Scar Assessment Scale (POSAS)). No restrictions on the follow-up period, publication data, language, or publication status were used.

Information sources

RCTs were identified by searching the Cochrane Wounds Group Specialized Register, Ovid Medline, Ovid Embase, and EBSCO Cinahl up to September 2011, as well as the Cochrane Central Register of Controlled Trials (CENTRAL) up to issue 3, 2011. Furthermore, the authors screened the reference lists of all included articles to identify additional relevant trials.

Study selection

Two review authors independently selected potentially relevant trials based on the titles and abstracts of the articles identified by the search. Full-text versions of the articles were obtained if they matched the eligibility criteria or if further scrutiny was needed regarding eligibility. The final trial selection was made independently by the same review authors. A third review author was involved in case of any discrepancies.

Data collection process

Two authors independently extracted and summarized characteristics and data from the included trials using a predefined data extraction sheet. Disagreements were resolved by discussion, and a third author made the final decision if needed. Data from trials published in duplicate were included only once.
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Risk of bias in individual studies

The methodological quality of each trial was determined by two authors independently. The Cochrane Collaboration appraisal tool was used to assess risk of bias\textsuperscript{13}. Again, a third review author arbitrated any discrepancies.

Data items

The data extracted were: (1) characteristics of the trial (e.g. study design, method of randomization); (2) number of participants per intervention group; (3) types of intervention compared; (4) estimated effects of primary and secondary outcomes; and (5) funding resource.

Summary measures and methods of analysis

Quantitative data were entered and analyzed in RevMan 5.1.4 (Copenhagen: Nordic Cochrane Centre, Cochrane Collaboration, 2011) by one author, and checked by another. Summary estimates of the treatment effects (with 95\% Confidence Intervals \([CI]\)) were calculated for every comparison. For continuous outcome parameters, mean differences (MD) were calculated, and risk ratios (RR) were determined for dichotomous outcome parameters. If it was not possible to calculate these summary estimates, P-values were presented as stated in the original article. In this review, the authors presented quantitative data using a vote-counting table, presenting a simple count of the number of studies significantly in favor of a dressing material (+), the number of studies against (-) it, and those with indifferent results (0).

Figure 1. Flow of information through the various phases of a systematic review
Chapter 4

RESULTS

Study selection

The search provided a total of 635 possibly relevant titles, of which 18 fulfilled the eligibility criteria. The study inclusion process is shown in figure 1.

Table 1. Characteristics and methodological quality of included studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>N*</th>
<th>Intervention</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnea^15</td>
<td>Israel</td>
<td>46</td>
<td>Hydrofiber (Aquacel®) (n=23)</td>
<td>Gauze (paraffin gauze) (n=23)</td>
</tr>
<tr>
<td>Barnett^26</td>
<td>USA</td>
<td>60</td>
<td>Film (Tegaderm®; Opsite®) (n=46)</td>
<td>Gauze (fine mesh gauze)</td>
</tr>
<tr>
<td>Cadier^27</td>
<td>England</td>
<td>21</td>
<td>Hydrocolloid (Dermasorb®) (n=21)</td>
<td>Gauze (Jelonet®) (n=21)</td>
</tr>
<tr>
<td>Cihantimur^24</td>
<td>Turkey</td>
<td>80</td>
<td>Alginate (Kaltostat®) (n=40)</td>
<td>Gauze (Jelonet®) (n=40)</td>
</tr>
<tr>
<td>Demetriades^18</td>
<td>South-Africa</td>
<td>20</td>
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<tr>
<td>Dornseifer^17</td>
<td>Germany</td>
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<td>Film (Opsite®) (n=unclear)</td>
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<td>USA</td>
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<td>Gauze (Xeroform®) (n=38)</td>
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<td>Nigeria</td>
<td>92</td>
<td>Film (Opsite®) (n=46)</td>
<td>Gauze (Sofratulle®) (n=46)</td>
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<td>Denmark</td>
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<td>Hydrocolloid (Duoderm E®) (n=8)</td>
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<tr>
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<td>Thailand</td>
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<td>Ionic silver-containing hydrofiber</td>
<td>Gauze (paraffin gauze)</td>
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<tr>
<td>O’Donoghue^20</td>
<td>Ireland</td>
<td>51</td>
<td>Alginate (Kaltostat®) with 0.25% bu</td>
<td>Gauze (Jelonet®) (n=21)</td>
</tr>
<tr>
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<td>Sweden</td>
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<td>Tan Baser^21</td>
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<td>40</td>
<td>Film (Omniderm®) (n=20)</td>
<td>Gauze (fine mesh gauze) (n=40)</td>
</tr>
</tbody>
</table>

* = number of study subjects included (e.g. patients, wounds, or wound halves). 1, random sequence; 2, allocation concealment; 3, blinding care provider; 4, blinding patient; 5, blinding outcome assessor; 6, drop-out rate acceptable (i.e. <20% for short-term follow-up and <30% for long-term follow-up); 7, intention to treat analysis; 8, selective reporting (e.g. all pre-specified outcomes in the methods are reported in the results, trial reported on key outcomes that would be expected); 9, risk of other bias, including baseline comparability, similar co-interventions, financial support.
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Characteristics of included studies

Table 1 shows the characteristics and methodological quality of the included trials. Trial sizes ranged from 8 to 60 patients, totaling 570 patients. All trials were published between 1983 and 2011. The RCTs contained patients undergoing a split-skin operation as a treatment for different indications, i.e. burns (n = 6), chronic wounds (n = 1), various reasons (n = 9), not specified (n = 2). A few studies randomized different wounds within the same patients. The study by Iregbulem et al. included only dark-skinned patients. The 18 included trials compared gauzes (n = 14), hydrocolloids (n = 8), films (n = 7), alginates (n = 3), and hydrofibers (n = 3). Intervention and comparator dressings differed among the trials. None of the included trials studied silicone dressings. Most trials reported on wound healing and infection, although these outcomes were assessed in various ways. Only one trial investigated itching.

<table>
<thead>
<tr>
<th>Outcomes</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>Healing, pain, infection, scarring</td>
<td>One year after surgery</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, pain, infection</td>
<td>Until healing</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, infection</td>
<td>Until healing</td>
<td>+</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, pain, infection</td>
<td>Until healing</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, infection</td>
<td>Until healing</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, scarring, costs</td>
<td>Until healing</td>
<td>+</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
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<td>Maximum 14 days</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
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<td>Maximum 28 days</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
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<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, pain, infection</td>
<td>Until healing</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Healing, infection</td>
<td>10 days</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
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<td>14 days</td>
<td>+</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Healing, infection</td>
<td>Until healing</td>
<td>+</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Healing, pain, infection</td>
<td>Until healing</td>
<td>+</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Healing, infection</td>
<td>17 days</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Healing</td>
<td>8 days</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Healing, pain, infection, scarring</td>
<td>6 months</td>
<td>?</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>?</td>
<td>+</td>
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<td>3</td>
<td>13</td>
<td>5</td>
<td>13</td>
<td>2</td>
</tr>
</tbody>
</table>
Risk of bias within the studies

The 18 RCTs varied in methodological quality (Table 1). The method of randomization was not stated in 13 trials (72%), and concealment of allocation was not ensured in any of the trials. The nature of the intervention made blinding impossible for patients and caregivers. In three trials (17%) it was stated that the outcome assessors were blinded for the intervention\(^{15-17}\), but only five trials (28%) mentioned the use of an intention-to-treat (ITT) analysis\(^{16,18-21}\).

Heterogeneity

The trials varied markedly in terms of comparator treatments and outcomes. As a result, clinical heterogeneity was substantial, which prohibited meta-analysis. Because meta-analysis was not feasible, the authors constructed a vote-counting table (Table 2).

Descriptive synthesis of results

The results are presented descriptively, in alphabetical order of the dressing, per outcome reported.

Wound healing

Overall, wound healing was reported in all of the 18 trials, but was measured in different ways, such as time to complete healing, and the proportion of wounds healed within the follow-up period. Table 2 summarizes the results of the comparisons between various dressings. Not one dressing seemed to be superior compared to all others, although gauze appeared to be disadvantageous in terms of wound healing.

Alginate dressings vs. hydrocolloid dressings

One trial compared alginates with hydrocolloids\(^{22}\). No significant differences were found in the number of patients reaching complete wound healing between alginates (14 out of 28) and hydrocolloids (20 out 30) at the first inspection (exact time point not mentioned) (RR 0.75, 95% CI 0.48 to 1.17).

Alginate dressings vs. gauze dressings

Three trials compared alginates with gauzes\(^{20,23,24}\). Two trials found a significant difference in complete wound healing in favor of alginates measured at days eight or ten (RR 1.98, 95% CI 1.45 to 2.69 and 2.22, 95% CI 1.19 to 4.15, respectively)\(^{20,24}\). However, Steenfos et al.\(^{23}\) found no significant differences in complete healing at day six (RR 3.00, 95% CI 0.37 to 24.17).
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Film dressings vs. hydrocolloid dressings
Two trials compared films with hydrocolloids\textsuperscript{19,25}. Leicht et al.\textsuperscript{19} found a significantly longer healing time for films (mean 10.63 days, SD 1.3) than for hydrocolloids (mean 7.63 days, SD 1.06) (MD 3.00, 95% CI 1.84 to 4.16). This is in contrast with the results of Rohrig et al.\textsuperscript{25}, who found no significant difference in days to complete wound healing (MD -0.92, 95% CI -4.27 to 2.43).

Film dressings vs. hydrofiber dressings
Only one trial compared films with hydrofibers, and reported a significant difference in the proportion of completely healed wounds in favor of film compared to hydrofibers at postoperative day 10 (reported P-value < 0.001)\textsuperscript{17}.

Film dressings vs. gauze dressings
Four trials compared films with gauzes\textsuperscript{14,16,21,26}. Three of these trials found a significant difference in days to complete wound healing in favor of films (MD ranging from 3.70 to 7.74 days)\textsuperscript{14,21,26}. Conversely, Persson et al. reported no differences in percentage healed wound area (reported P-value = 0.3)\textsuperscript{16}.

Hydrocolloid dressings vs. gauze dressings
Five trials compared hydrocolloids with gauzes\textsuperscript{18,27-30}. Two of these trials reported a significantly shorter wound healing time in favor of the hydrocolloid dressings (P-values of 0.003 and <0.002, respectively)\textsuperscript{27,30}. Cadier et al. also found a significant difference at the final assessment (exact time not stated) in a proportion of completely healed wounds (RR 0.45, 95% CI 0.27 to 0.74). These results are in contrast with Feldman et al.\textsuperscript{28}, who found a significant delay in wound healing in the hydrocolloid group (15.3 days) compared to 10.5 days in the gauze dressing group (P-value <0.002)\textsuperscript{28}. Demetriades et al.\textsuperscript{18} reported a significant difference in the proportion of completely healed wounds at day 8 in favor of hydrocolloids (5 out of 10) compared to gauzes (1 out of 10). However, when recalculating their reported data, a significant result was not found (RR 0.20, 95% CI 0.03 to 1.42). Furthermore, one trial found no significant differences in the number of patients with complete healing at the end of the study (although it was not clear what the follow-up duration was) (RR 1.20; 95% CI 0.95 to 1.50)\textsuperscript{29}.

Hydrofiber dressings vs. gauze dressings
Two trials compared hydrofibers with gauzes\textsuperscript{15,31}, and both trials found a significant difference in wound healing in favor of hydrofibers (P-values 0.016 and 0.027, respectively). In the trial of Barnea et al.\textsuperscript{15}, the time to complete wound healing ranged
from 7 to 10 days in the hydrofiber group compared with 10 to 14 days in the gauze group. Lohsiriwat et al.\textsuperscript{31} found a mean healing rate of 7.90 days (SD 2.47) in the hydrofiber group compared to 11.20 days (SD 5.32) in the gauze group. It was not possible to calculate mean differences because it was unclear how many donor sites in each group were included.

**Pain**

Overall, pain was reported in eight trials, but it was measured at different time points. None of the studies investigated pain when using alginate dressings (Table 2). In 7 out of 8 studies, gauzes turned out to cause more pain. Only pain in-between dressing changes are presented in the vote-counting table.

*Film dressings vs. hydrocolloid dressings*

Only one trial compared pain rates between films and hydrocolloids\textsuperscript{25}. Patients treated with films had significantly higher pain rates (P-value <0.001).

*Film dressings vs. gauze dressings*

Three trials compared pain rates between films and gauzes\textsuperscript{16,21,26}, and two found a significant difference in pain scores in favor of films (MD 3.10 [95% CI 1.92 to 4.28] and 1.30 [95% CI 0.66 to 1.94], respectively)\textsuperscript{21,26}. Persson et al.\textsuperscript{16} found no significant differences assessed one to two days postoperatively (P-value = 0.08), whereas VAS scores 14 days postoperatively were significantly lower in favor of film dressings (P-value = 0.014).

*Hydrocolloid dressings vs. gauze dressings*

Two trials compared pain rates between hydrocolloids and gauzes\textsuperscript{28,29}. Both reported significantly lower VAS scores for patients treated with hydrocolloid dressings (average pain scores of 0.53 and 2.94, respectively) compared to gauze dressings (average pain scores of 2.41 and 4.64 with P-values of 0.01 and <0.001, respectively).

*Hydrofiber dressings vs. gauze dressings*

Two trials compared pain rates between hydrofibers and gauzes\textsuperscript{15,31}. One of these trials found a significant difference in pain in favor of hydrofiber measured at different time points postoperatively\textsuperscript{15}. Lohsiriwat et al.\textsuperscript{31} found no significant differences at rest, with a rate of 0.74 in the hydrofiber group compared to 0.80 in the gauze dressing group (P-value = 0.894). However, they found lower mean pain scores at
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dressing removal in favor of the hydrofiber dressing group (3.12) compared with the
gauze dressing group (4.70) (P-value = 0.027).

Other endpoints

Overall, infection was reported in 16 trials. Infections rarely occurred in the trials and
none of the studies found a significant difference related to one of the six treatment
arms. In addition, no significant difference was found for itching (Table 2). Only Leicht
et al. reported on itching19. However, in their study none of the patients complained
about itching.

Two trials reported on costs17,28. One of these trials reported that gauzes are less
expensive compared to hydrocolloids, with average dressing costs per patient of 1.16
dollars in the gauze-treated group compared to 54.88 dollars in the hydrocolloid-
treated group28. The other trial found that using hydrofibers turned out to be
approximately four times more expensive compared to films. However, these amounts
seem to refer to direct costs only.

Three trials reported on scarring using the VSS17,21 or a modified VSS15. Only
Dornseifer et al.17 stated that there were no differences in scarring (no data given). Tan
Baser et al.21 found a significantly better score in the film dressing group compared to
gauzes (pigmentation: MD 0.85; 95% CI 0.37 to 1.33; vascularity: 0.85; 95% CI 0.37
to 1.33), but no significant difference was found in the pliability score (MD 0.39; 95%
-0.02 to 0.80). Barnea et al.15 reported a significantly better score in the hydrofiber
dressing group compared to the gauze group at one year postoperatively (P-value =
0.0091).

<table>
<thead>
<tr>
<th>Table 2. Overview of results using vote-counting</th>
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<tbody>
<tr>
<td><strong>Alginate vs.</strong>&lt;br&gt; <strong>other dressings</strong></td>
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<tr>
<td>Outcome</td>
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<tr>
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</tr>
<tr>
<td>4 trials</td>
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<td>7 trials</td>
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<td>14 trials</td>
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<td>8 trials</td>
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<td>3 trials</td>
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Chapter 4

DISCUSSION

Evidence from currently available mediocre-quality RCTs shows that gauze dressings have been studied most often, but should be avoided in the local treatment of DSWs in patients after split-skin grafting, as these dressings lead to longer healing times and higher pain scores. Also, hydrocolloids and films have been well-studied and appear to be effective in terms of wound healing and pain relief. Other dressings, like alginates and hydrofibers, also seem to perform better than gauzes, and although silicone dressings are commonly used to cover DSWs, no trials were identified in this review to support this practice.

The findings of this study corroborate the conclusions of the already available reviews1-2,9. These reviews also included other study designs apart from RCTs. The current review only included studies with a higher internal validity, which could therefore be considered as more robust evidence. One of the strengths of this review is that it focused on the dressings most commonly used in daily practice. Despite a varying methodological quality, the available evidence suggests the use of dressings that support a moist wound environment. This may prevent tissue dehydration and cell death, thereby accelerating angiogenesis, increasing the breakdown of dead tissue, and potentiating the interaction of growth factors with their target cells32.

Vote-counting was used to present the results in an understandable and pragmatic way. However, this method is open for debate, as it assumes equal weight being given to each study and effect, regardless of their size. As a result, this review also reported summary estimates of the treatment effects to allow the reader to better appreciate the size and precision of the positive, negative and indifferent findings. Second, the included studies were published over a period of 28 years, in which techniques and indications may have changed. However, the technique of split-skin grafting seems not to have changed largely over the years. Therefore, we do not think that this time interval affected our conclusions. Third, this review does not offer evidence for other clinically relevant questions related to the treatment of the DSW.

Apart from the type of dressing used, other factors also influence the treatment results, for example the harvest site (mostly located on the upper leg4), the thickness of the harvested skin (and thus the depth of the donor site wound)33, the age of the patient, the use of pertinent medication, such as steroids34, and pre-existing diseases, such as diabetes. Another factor may be the use of various haemostatic agents to limit intra-operative blood loss35. According to the best available evidence, epinephrine and fibrin sealant appear to be superior for achieving haemostasis when substantial topical blood loss is anticipated, particularly in cases of (larger) split-skin grafts35. However, it is unclear what the effects of these haemostatic agents are on wound healing. This question deserves further investigation. Furthermore, the general outcome of split-skin grafting may be less favorable when applied to severely ill or multi-morbid patients.
Although most of the included trials measured patient-related and clinically relevant outcomes, endpoints like adverse effects, scarring and cost-effectiveness were underreported. This may be explained by the fact that DSWs, being clean, superficial wounds, normally heal without any large problems and generally fully reepithelialize in 7 to 21 days\textsuperscript{33}. Itching was described in only one trial\textsuperscript{19}, so it remains unclear whether itching is a major problem in DSWs. From previous studies regarding burns and linear scars, itching has a serious impact on patient satisfaction\textsuperscript{36-38}. Within this review, only three trials measured scarring\textsuperscript{15,17,21}. Scarring may have a psychological impact and could affect the patient’s quality of life, particularly if scars are located in visible areas\textsuperscript{39}. Therefore, evaluating scars is important to balance the pros and cons of wound care options and make well-informed clinical decisions for the treatment of wounds and prevention of scars. There are two reasons why the evaluation of scars is of interest. First, caregivers and patients do not agree in their judgment of the donor site scar, and second, they value different aspects of the scar\textsuperscript{40}. Furthermore, cost-effectiveness was not investigated. Only the cost of dressings was given, which gives an incomplete estimation. However, the total cost of the local wound treatment is strongly dependent on the combinations of products used and the frequency of dressing changes. The latter is a proxy for staff costs, which has a prominent role in the summary of costs when plotted against effectiveness.

Further evaluation through well-designed and well-conducted RCTs is needed to corroborate the clinically relevant effects of dressing options for DSWs, preferably in multicenter studies, as the results of single-center studies may show larger effects or are contradicted when tested in multicenter settings\textsuperscript{41}.

In conclusion, an evidence-based choice of a wound dressing in the treatment of donor site wounds after split-skin grafting does make a difference, particularly in terms of wound healing and pain. With some caution the use of dressings that promote a moist wound environment, such as hydrocolloid and film dressings, can be advocated.
REFERENCES


